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CONQUEST OF MALARIA

The views of Surgeon- General Gorgas.

Interviewed by

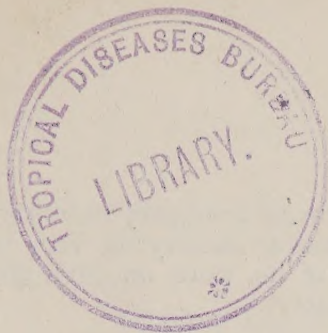
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Conquest of Malaria.

THE VIEWS OF SURGEON-GENERAL GORGAS.

(United States Army. Late Chief Sanitary Officer of the Panama Canal Commission).

INTERVIEWED BY Dr. WILLIAM MACDONALD.

(Author of "Farming in South Africa," of which the following Interview forms the 47th Chapter).

IN the Union of South Africa, Swaziland and Rhodesia there are many places where malaria fever is to be found; but there are none from which this disease cannot easily be eradicated with energy and the application of modern methods. Indeed, it is hard to realise that not very long ago Delagoa Bay was looked on as a white man's grave, and that the pleasant and sweetly clean city of Durban was once a place where at times mosquitoes made life almost unbearable. It is most important that malaria fever should be completely eradicated from our Low Veld because such rich agricultural regions are eminently fitted for closer settlement. These deep alluvial lands, fertile with mountain and river wash of centuries, pregnant with humus, possess immense potential wealth. Here in the near future we may hope to see the establishment of many commercial cultures, such as oranges and tobacco, tea and coffee, cotton and bananas, pawpaws and pineapples, sugar cane and fibre plants.

The other day I had the privilege of discussing this question from the standpoint of the settler with Surgeon-General Gorgas, who has gained so much renown as the Chief Sanitary Officer of the Isthmian Canal Commission. As is well-known General Gorgas is the greatest living authority on all matters connected with the eradication and sanitation of malaria. I am, therefore, much indebted to him for his kindly courtesy in answering my many questions, and I am sure his opinions will command the respectful attention of all who have to make their homes in the fever zones of South Africa.

HOPE FOR SOUTH AFRICA.

What do you think of South Africa as a malarial country, General?—Well, most of the country that I have seen is not naturally an unhealthy region. The topographical conditions are such that one can predict that within a few years cultivation, clearing and drainage and the drying of the soil that necessarily accompanies such measures will rid the country of both malaria and blackwater fever. It is a very general observation that a region originally malarious becomes free from malaria and healthier as settlement and cultivation proceed. As an instance, the regions in the United States comprised in the States of Indiana, Illinois and Michigan fifty years ago were notorious for the amount and severity of their malaria, and were known throughout the country as being most unhealthy regions. To-day there is in these localities little or no malaria, and this section is known as one of our healthiest and most productive agricultural regions. This has been the rule everywhere as new countries have been settled up. At first severely malarious, with settlement, cultivation and drainage becoming salubrious and healthy. In South Africa, where so much of the country is naturally well drained and salubrious, I confidently predict that this change will rapidly come about. What is needed is the adoption of such measures as will protect the settler till this desirable condition is brought about. These measures are well known to sanitary science and have been abundantly tested over and over again.

PROTECTIVE MEASURES.

Kindly tell me something about these measures?—You are aware, of course, that malaria is due to a minute microscopic parasite that gets into the blood of the human being and causes the symptoms which we know as malaria. Furthermore, it has been proved positively that the parasite is transferred from person to person by a certain species of mosquito—the anopheles—and is transferred in no other way. There are several species of mosquito, but this one alone transfers malaria. The knowledge of the life habits of the malarial parasites and of the mosquito has enabled man to work out methods whereby he can protect himself from malaria and eradicate the disease in any given locality. The most practical and feasible of these methods is that of destroying the mosquito during its larval stage. With this object the ground around every dwelling in a malarious country should be carefully drained for a space of two hundred yards. All water containers of all kinds within this space should be at the same time destroyed, such as old cans, bottles, etc. We have adopted the limit of two hundred yards as that is about the extent of a single flight of an anopheles mosquito. If for any reason there are within this limit collections of water that cannot be done away with, paraffin oil can be used. The oil acts by smothering the larvae. Every minute or two the larvae has to breathe, and for this purpose it has to rise to the surface of the water. Paraffin oil spreads in a thin coat over the surface of the water. When the larvae next rises to the surface to obtain air the oil enters its breathing apparatus and smothers the insect. If oil is not suitable, as on the grassy edge of a stream, some poisonous larvicide can be used. These methods are all directed against the mosquito in its larval stage.

Is the destruction of the mosquito larvae the most important measure?—Yes; it is by far the most important anti-malarial measure we have at our command. Of measures directed to the destruction of the larvae, drainage is much the most important and should always be carried out as completely as local conditions will allow. It is obvious in this connection that it is well to locate the dwellings on as high ground to the windward side and as far from water as circumstances will permit, because under such circumstances there will be the less anti-mosquito work to do. My experience has taught me that man can protect himself from malaria anywhere. If it is absolutely essential that he should locate his dwelling on the edge of a swamp or bank of a Tropical stream he can do

so. But the care necessary for his protection in such a locality is very much greater than if he were on high ground away from water.

ADULT MOSQUITOES.

What about the adult mosquito?—That is the next point; the anopheles mosquito is very liable to destruction by wind and the direct rays of the sun. For this reason she seeks bushes, shrubbery, house or any shelter that will protect her against the wind and sun. It is, therefore, very important to clear off such material within the two hundred yards limit round the dwelling. When the mosquito reaches the cleared space she is unable to fly across. If there is no breeding place within the cleared area, the dwelling will be pretty safe from malaria. Only the female mosquito has a biting apparatus, and therefore she alone is concerned in the transmission of the disease.

Do you advocate the use of mosquito nets?—Most certainly. It is almost always the case that the above measures cannot be made absolutely perfect; some mosquitoes will get to the dwelling. To guard against this, the house should be made mosquito proof. This can be done by using wire-netting on the doors and windows, and closing all crevices so that the mosquito cannot gain access. With a little care the poorest cabin can be made as safe from the mosquito as the best house. Some mosquitoes will overcome all these obstacles and get into the house. Such mosquitoes hide during the day in dark places about the dwelling, and can be very easily killed by anyone with a little experience. When the mosquito gets in from the outside she is generally uninfected, and has to bite somebody with malaria before she can do any harm. And it is known from experiment that at least twelve days must elapse from the time she got in till the period at which the bite would give malaria. Therefore, if every day the mosquitoes in a properly screened house are carefully killed, there is very little chance of an individual mosquito surviving sufficiently long to become infected. At Panama we found these measures most effective.

Still some mosquitoes will pass all these lines of defence. The anopheles is a night-biter; she seldom bites during the day time. She, therefore, generally infects the individual when he is asleep at night. If we can protect him during this period of the twenty-four hours his chances for contracting malaria are much lessened. A properly constructed mosquito netting over the sleeping quarters will generally do this very thoroughly. My experience has taught me that the best netting is that of canopy shape having no slit, and well

headed at the bottom. This requires little or no care in arrangement and is very effective.

VALUE OF QUININE.

Have you any other preventive measures?—Yes, some mosquitoes will still pass the last line of defence of which I have spoken, and for these we have another measure to meet such emergency. It is that well-known substance called quinine, which is poisonous to the parasite, and, happily, has at the same time very little effect on the person in whom the parasite dwells. This substance is the alkaloid of a tree, native to Peru, in South America. If an individual lives in a badly malarious country and takes five grains of quinine daily he will always have some quinine circulating in his blood. When an anopheles mosquito injects malarial parasites into his blood under these circumstances, the parasites are at once killed by absorbing the quinine so poisonous to them. Malaria always has to be got by the mosquito from some human being harbouring the malarial parasite in the blood. It is important, therefore, to keep at a distance persons who are suffering from malaria or who are carrying the parasite in their blood. The native of South Africa is very extensively infected with this parasite, though he is not always made sick by it. Long exposure to malaria has given him more or less immunity to the disease. The parasite is still more commonly found in the blood of native children. It is important, therefore, to keep native habitations at a distance from living quarters of the whites so that the mosquitoes about the white quarters may not become infected.

MALARIA CAN BE ERADICATED.

Do you believe malaria can be eradicated from any locality?—Assuredly. Any of the measures just mentioned, if carried out perfectly, would protect the individual and eradicate malaria from any given locality. Humanly speaking, it is impossible to carry one of them out in its entire perfection. If they are all adopted, and carried out as carefully as the local conditions will allow, any individual anywhere can protect himself from malaria, and any locality, no matter how unfavourably situated or how badly infected with malaria, can be freed from this disease. This statement is not based on theory. It has already been accomplished many times, in many different parts of the world, by many different men. In Havana, Cuba, the methods mentioned above were first worked out and put into practice. Havana at the time referred to was a city of 250,000 inhabitants. Their deaths from malaria for the ten years preceding 1900 varied between four hundred and eight hundred a year. Yellow fever,

another mosquito-borne disease, had continuously existed in the city for the previous hundred and fifty years. The anti-mosquito measures outlined above were put into effect during the year 1901. The results were evident before the end of that year. For the last four years the deaths from malaria have fluctuated between ten and twenty for the whole city and there has been no yellow fever at all. In 1911 the death-rate from malaria fever on the Isthmus of Panama among the white American employes, their wives and families, 10,661 men, women and children, was one man and two children. These workers are fully as healthy and vigorous in appearance as a similar population living in the healthy portions of the United States. The total death-rate from disease in the whole force in 1906 was: 41.24 per 1,000; during 1912 it had dropped to 6.37 per 1,000 out of a total average force of 50,893 men. What has been accomplished as to malaria at Panama can be accomplished anywhere else if the same measures are carried out.

BLACKWATER FEVER.

Is blackwater fever a new disease?—Oh, no. It is a well-known disease in almost all parts of the world in which pernicious malaria prevails and in which the white man lives. We have it in the Southern parts of the United States, and have had it during the last six years at Panama. Both in the United States and at Panama the methods and conditions that have been successful in the case of malaria have also been successful in the case of blackwater fever. Some people seem to think that because we do not know the germ of blackwater fever we can not do anything to control it. We do not yet know the germ of yellow fever, yet it is the disease over which we have most sanitary control. By carrying into effect anti-mosquito measures Havana was cleared of yellow fever within a year, and at Panama, due to the same measures, we have had no yellow fever since 1906. Personally, I am inclined to think that blackwater fever is a phase of malaria. But whether it is due to the malarial parasite or a specific germ is of no more practical sanitary importance than it is at present for us to know the specific germ of yellow fever. In both cases we know the measures that will prevent. This is the great point in practical sanitary science. We do not know what electricity is, yet the control of and the application of this force in the industrial world is of ever-growing importance.

EDUCATION.

What is the great need in our campaign against Malaria?—To my mind—Education. What is really wanted is a campaign

of education to impress on all settlers in South Africa the fundamental fact that the mosquito conveys malaria, and the details of how the disease can be prevented. If they were thoroughly convinced of this they would soon protect themselves. If they were as sure that the mosquito conveyed malaria as they were that the bite of the cobra conveys a deadly poison there would soon be as few mosquito bites as there are cobra bites. The Italian Government has adopted the plan of selling quinine in a malarious district at cost price, and with excellent results. From a sanitary point of view the Government of South Africa might even go further, and in these same districts sell quinine and also wire netting at cost price.

SUMMING UP.

Summing up, I would urge on all settlers who live in low-lying malarious regions: First, the taking daily of a preventive dose of five grains of quinine, both themselves and all the natives in their immediate employment; second, to make the dwelling-house completely mosquito proof. Any hut with a little care can be rendered completely inaccessible to the mosquito. Third, to clear and drain within two hundred yards of the dwelling; fourth, the use of a properly-constructed mosquito netting over the sleeping-place. As the settler becomes better established financially he can extend and improve these measures. These four measures, if care-

fully carried out, will protect him against both malaria and blackwater fever from the time he enters the malarious district. The cost of protecting himself against malaria will not cost the agriculturist, who is living in a Semi-tropical country, anything like as much as his brother farmer spends in protecting himself against, say, the cold of Dakota or Manitoba. Finally, if the settlers of South Africa can be so educated that they will thoroughly carry out these measures, I feel confident that malaria and blackwater fever will at once begin to decrease in these districts and, within a few years, disappear as they have in other parts of the world.

Before closing this chapter I should like to refer to the excellent work done by the Medical Officer for the Selati Railway, Dr. J. Stanley Avery, in 1910, at Newington in the Northern Transvaal. Newington is situated in the Lydenburg district, 74 miles N.-N.-W. of Komati-poort. Dr. Avery summarises the results of his most successful anti-malarial campaign as follows: "There has not been a single case of primary infection and only one of reinfection in Newington itself during the whole of the fever season which is now practically at an end; in other words the victory has been as complete as any victory is ever likely to be." All those who are interested in this splendid work should become members of the South African Anti-Malarial Association, the secretary of which is Mr. W. A. J. Cameron, P.O. Box 2879, Johannesburg.

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